Claims

1. A method for entering data in an electronic apparatus housed within a body, which method comprises the steps of
- emitting infrared radiation from at least one infrared transmitter in at least one plane,
- placing an obstacle in the radiation field of the infrared transmitter,
- receiving infrared radiation reflected from the obstacle by at least one infrared receiver in at least one plane,
- preprocessing the received reflected signal, and
- determining the position of the obstacle on the basis of the received preprocessed signal,
- wherein for determination of the position of the obstacle in at least one plane, a neural network arrangement is used into which the preprocessed signal is conducted to determine the position.

2. A method according to claim 1 wherein the neural network arrangement is a BP network.

3. A method according to claim 1 wherein in signal preprocessing, an analog sample is taken from the received signal, the analog sample taken is converted digital in an AD converter, a train of samples is formed of successive digital samples and the said digital train of samples is low-pass filtered by a digital filter.

4. A method according to claim 1 wherein infrared radiation is received by two infrared receiver arrangements at a known angle with respect to each other in order to determine the position of a three-dimensional obstacle.

5. A method according to claim 1 wherein infrared radiation is received by two infrared receiver arrangements at a known angle with respect to each other in order to recognize the movement of a three-dimensional obstacle.

6. An input arrangement for entering data in an electronic apparatus housed within a main body, which arrangement comprises a means for creating and using a virtual keyboard containing at least one row of virtual keys generated in an input area outside the main body of the apparatus, wherein the said means further comprises a pattern-recognizing neural network element stored in the memory of the apparatus to recognize the use of a given key in the virtual keyboard.

7. An input arrangement according to claim 6 wherein the means for creating a virtual keyboard comprises an IR transceiver arrangement, which comprises an infrared transmitter for emitting infrared radiation to the data input area and an infrared receiver for measuring the infrared radiation reflected from an obstacle.

8. An input arrangement according to claim 7 wherein the infrared receiver includes a peak value hold circuit.

9. An input arrangement according to claim 7 wherein the IR transceiver arrangement includes an oscillator to generate the clock frequency required by the input arrangement.

10. An input arrangement according to claim 6 wherein the arrangement further comprises a signal preprocessing part to convert an analog signal into a digital signal.

11. An input arrangement according to claim 10 wherein the signal preprocessing part includes a background radiation compensation circuit, sampling circuit and AD converter and a low-pass filter.

12. An input arrangement according to claim 11 wherein the upper frequency limit of the low-pass filter is of the order of 5 to 20Hz.

13. An input arrangement according to claim 11 wherein the low-pass filter is an IIR filter.

14. An input arrangement according to claim 11 wherein the low-pass filter is a FIR filter.

15. A neural network element of an input arrangement according to claim 6 wherein the said neural network element comprises a signal input part and at least one neural network.

16. A neural network in an input arrangement according to claim 15 wherein the neural network is a BP network.

17. An input arrangement according to claim 16 wherein the BP network comprises at least one input signal feed line for inputting data to at least one of the neurons of a hidden layer, at least one hidden layer, at least one connection from the neurons of the hidden layer to the output cells of the neural network, and at least

one output cell of the neural network to indicate the decision made by the neural network.

18. An input arrangement according to claim 6 wherein the input arrangement comprises two input arrangements at a known angle with respect to each other in order to create a three-dimensional virtual user interface.

19. An input arrangement according to claim 6 wherein the said electronic apparatus is a cellular phone.

20. A program in a neural network element belonging to a virtual keyboard for recognizing the position of an obstacle placed in the virtual keyboard, the program comprising:
- a step of receiving input signals in at least one neuron of a hidden layer,
- a step of weighting input signals by suitable weighting coefficients in each hidden-layer neuron,
- a step of adding up the weighted input signals in each hidden-layer neuron in order to produce an output signal,
- a step of processing the output signal in the activation element of each hidden-layer neuron in order to produce a result signal,
- a step of processing the result signals of the hidden-layer neurons in the output cells, and
- a step of implementing the results of the inference routines of the neural network element.

21. A neural network program according to claim 20 wherein the program is stored in the memory of an electronic apparatus to realize a virtual keyboard.

22. A neural network program according to claim 21 wherein the electronic apparatus is a cellular terminal.

23. A cellular terminal comprising
- means for receiving signals,
- means for transmitting signals,
- a means for controlling the operation of the terminal,
- a memory for storing programs,
- an IR transceiver for creating a virtual keyboard,
which cellular terminal further comprises a neural network program stored in the memory of the terminal to implement the inference routines for the operation of the virtual keyboard.

24. A terminal according to claim 23 wherein it is a cellular phone.